EXHIBIT 9

UNITED STATES DISTRICT COURT

DISTRICT OF DELAWARE

Civil Action No.

04-1373-KAJ

****

AMPEX CORPORATION,

Plaintiff,

v.

EASTMAN KODAK COMPANY, ALTEK

CORPORATION and CHINON

INDUSTRIES, INC.,

Defendants.

****

ORIGINAL

VIDEOTAPED DEPOSITION OF DIETER W. PREUSS, PhD, a witness called on behalf of the Plaintiff, taken pursuant to the Federal Rules of Civil Procedure, before Maureen O'Connor Pollard, RPR, CLR, and Notary Public within and for the Commonwealth of Massachusetts, at the offices of Ropes & Gray, LLP, One International Place, Boston, Massachusetts, on the 5th of May, 2006, commencing at 9:29 o'clock a.m.

DIETER W. PREUSS, Ph.D. May 5, 2006

11:07:12	1	Q. In formulating your opinions in this
11:07:15	2	case, do you recall relying on a more complete
11:07:19	3	version of the document that has been marked
11:07:21	4	Exhibit 9?
11:07:22	5	A. No, I don't explicitly recall that.
11:07:31	6	Q. Do all of the documents you have
11:07:33	7	relied upon in this case with respect to the
11:07:36	8	Hell Chromacom system refer to the same version
11:07:39	9	of the Hell Chromacom system?
11:07:41	10	MR. HIRSCH: Objection.
11:07:44	11	A. Yes, I do. At that time there was
11:07:50	12	essentially only one version, except as I said
11:07:53	13	before these minor things, one or two disk .
11:07:58	14	drives, but these are not essential for the
11:08:00	15	functions of the system.
11:08:01	16	BY MR. SCHOENHARD:
11:08:02	17	Q. When you say "at that time," could you
11:08:03	18	be more specific?
11:08:05	19	A. Up to 1982, from the beginning when
11:08:08	20	the Chromacom was first marketed.
11:08:10	21	Q. In formulating your opinions of the
11:08:17	22	asserted claims of the '121 patent in light of
11:08:19	23	the Hell Chromacom system, did you perform an
11:08:22	24	analysis on a physical Hell Chromacom system?

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11:08:27	1	MR. HIRSCH: Objection.
11:08:28	2	A. I did not perform an analysis for the
11:08:31	3	purpose of this expert report. I just drew from
11:08:36	4	my knowledge as an engineer that designed the
11:08:40	5	system, and I've worked with it and have been to
11:08:46	6	customer sites and so on all the time that the
11:08:48	7	system was marketed.
11:08:51	8	BY MR. SCHOENHARD:
11:09:01	9	Q. Please direct your attention to
11:09:02	10	paragraph 35 that bridges pages twelve and
11:09:07	11	thirteen of your expert report.
11:09:11	12	Do you see that paragraph?
11:09:12	13	A. Yes.
11:09:13	14	Q. In the documents on which you relied
11:09:20	15	in forming your opinions in this case, is there
11:09:23	16	any disclosure of a computer at the Scan/Reco
11:09:29	17	station?
11:09:32	18	MR. HIRSCH: Objection.
11:09:38	19	A. I'm rather sure there is somewhere,
11:09:40	20	but I also -- I know definitely that there was a
11:09:46	21	computer, so actually I don't really need a
11:09:49	22	document for it to say that there was a
11:09:51	23	computer.
11:09:51	24	BY MR. SCHOENHARD:

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11:12:33	1	MR. HIRSCH: Objection.
11:12:34	2	A. This I don't quite remember whether
11:12:41	3	there is some description of the size reducer
11:12:45	4	somewhere in the documents, but I know there was
11:12:48	5	one in the Scan/Reco station.
11:12:50	6	BY MR. SCHOENHARD:
11:12:51	7	Q. Sitting here today, are you aware of
11:12:52	8	any disclosure of a size reducer at the
11:12:55	9	Scan/Reco station in the documents on which you
11:12:57	10	relied in forming your opinions in this case?
11:13:00	11	MR. HIRSCH: Objection. Asked and
11:13:00	12	answered.
11:13:01	13	A. Once more, please, the question?
11:13:11	14	BY MR. SCHOENHARD:
11:13:11	15	Q. Sitting here today, are you aware of
11:13:13	16	any disclosure of a size reducer at the
11:13:15	17	Scan/Reco station in the documents on which you
11:13:18	18	relied in forming your opinions in this case?
11:13:20	19	MR. HIRSCH: Objection.
11:13:21	20	Just wait for me to have a chance.
11:13:26	21	A. No. As I said, I don't recall where
11:13:30	22	in the documents the size reducer in the
11:13:33	23	Scan/Reco station might have been described.
11:13:35	24	BY MR. SCHOENHARD:

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11:13:37	1	Q. In the documents on which you relied
11:13:38	2	in forming your opinions in this case, is there
11:13:40	3	any disclosure of a random access memory
11:13:43	4	associated with the size reducer in the
11:13:44	5	Scan/Reco station?
11:13:45	6	MR. HIRSCH: Objection.
11:13:48	7	A. The same answer as before; I don't
11:13:52	8	recall whether there's somewhere described in
11:13:54	9	the documents. I know it was there.
11:14:04	10	BY MR. SCHOENHARD:
11:14:09	11	Q. Please direct your attention to
11:14:10	12	paragraph 37 on page thirteen of your expert
11:14:14	13	report.
11:14:15	14	Do you see that paragraph?
11:14:17	15	A. Yes.
11:14:17	16	Q. What do you mean by "the Chromacom
11:14:22	17	received images from a scanner that was
11:14:24	18	physically outside of the Chromacom system"?
11:14:27	19	MR. HIRSCH: You can read the whole
11:14:28	20	paragraph, Dr. Preuss.
11:14:31	21	(Witness reviewing document.)
11:14:46	22	A. It was -- the Chromacom system was one
11:14:54	23	unit essentially, although it was two separate
11:14:57	24	stations, Scan/Reco station and the Combiskop

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11:26:03	1	forming your opinions in this case?
11:26:04	2	MR. HIRSCH: Objection.
11:26:12	3	A. There can't be because it didn't have
11:26:14	4	separate input and output ports, it was just the
11:26:17	5	computer memory which had one port used for
11:26:23	6	input and output.
11:26:25	7	BY MR. SCHOENHARD:
11:26:26	8	Q. Is there any disclosure of the random
11:26:28	9	access memory associated with the mini-computer
11:26:32	10	at the Combiskop station having separate input
11:26:35	11	and output ports with physically separate pins
11:26:38	12	in any of the documents on which you relied in
11:26:41	13	forming your opinions in this case?
11:26:42	14	MR. HIRSCH: Objection.
11:26:43	15	A. Also the random access memory
11:26:45	16	associated with the Combiskop mini-computer was
11:26:51	17	normal computer RAM, or random access memory,
11:26:54	18	which had one port used for input and output.
11:26:58	19	BY MR. SCHOENHARD:
11:27:00	20	Q. Is there any disclosure of the random
11:27:01	21	access memory in the size reducer of the
11:27:04	22	Scan/Reco station have been separate input and
11:27:07	23	output ports with physically separate pins in
11:27:10	24	any of the documents on which you relied in

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11:27:12	1	forming your opinions in this case?
11:27:14	2	MR. HIRSCH: Objection.
11:27:15	3	A. There is certainly no disclosure of
11:27:20	4	this in the document because this again was a
11:27:23	5	level of detail which we wouldn't like to
11:27:25	6	disclose to competitors.
11:27:27	7	BY MR. SCHOENHARD:
11:27:29	8	Q. Do you know whether the random access
11:27:32	9	memory associated with the size reducer in the
11:27:35	10	Scan/Reco station of the Hell Chromacom system
11:27:38	11	had separate input and output ports with
11:27:41	12	physically separate pins?
11:27:43	13	A. I know that it had not. It had one
11:27:46	14	port like a normal computer RAM also for input
11:27:49	15	and output.
11:27:50	16	Q. Please direct your attention to
11:27:53	17	paragraph 45 on page sixteen of your expert
11:27:56	18	report.
11:27:58	19	Do you see that paragraph?
11:27:59	20	A. Yes, I see it.
11:28:01	21	Q. At the end of the fourth line of that
11:28:12	22	paragraph carrying over to the fifth line, do
11:28:15	23	you see the term "the image input from the
11:28:17	24	scanner"?

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11:33:03	1	image should be printed on the page, let's say,
11:33:06	2	at two inches by two inches size, and if the
11:33:10	3	output resolution to record the films for the
11:33:16	4	final page would be 200 lines per inch, then it
11:33:20	5	would be -- the full size image would have 400
11:33:23	6	by 400 pixels. And if full size image should be
11:33:29	7	printed at, let's say, four-by-four inches, then
11:33:35	8	it would be 800 by 800 pixels. So that was very
11:33:46	9	variable, a broad range of different size,
11:33:51	10	different resolutions of full size images.
11:33:54	11	BY MR. SCHOENHARD:
11:33:54	12	Q. Am I correct that in the Hell
11:33:56	13	Chromacom system, disks were transferred between
11:33:59	14	the Scan/Reco station and the Combiskop station
11:34:02	15	manually?
11:34:03	16	A. Up to '82, that time frame that we are
11:34:07	17	talking about, yes.
11:34:09	18	Q. Please direct your attention to
11:34:12	19	paragraph 46 on page sixteen of your expert
11:34:15	20	report.
11:34:17	21	A. Yes.
11:34:17	22	Q. Do you see that paragraph?
11:34:18	23	A. I see it.
11:34:19	24	Q. Do you see the sentence that reads

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11:35:50	1	an entire full size scanned image?
11:35:52	2	MR. HIRSCH: Objection.
11:35:58	3	A. Again, as I said before, the full size
11:35:59	4	images could have very different sizes, and
11:36:03	5	smaller ones could be stored completely in the
11:36:07	6	random access memory associated with the
11:36:11	7	computer's, bigger ones could not.
11:36:13	8	BY MR. SCHOENHARD:
11:36:13	9	Q. How large was the random access memory
11:36:16	10	in the R-10 mini-computer of the Scan/Reco
11:36:17	11	station of the Hell Chromacom system?
11:36:20	12	A. I think it was 256 Kbytes, meaning
11:36:28	13	262,000 something kilobytes.
11:36:32	14	Q. Are you sure?
11:36:34	15	MR. HIRSCH: Objection.
11:36:34	16	A. I think so, yes.
11:36:41	17	BY MR. SCHOENHARD:
11:36:41	18	Q. How large was the random access memory
11:36:44	19	associated with the size reducer in the
11:36:49	20	Scan/Reco station of the Hell Chromacom system?
11:36:54	21	A. This I don't remember really now.
11:37:29	22	Q. When would an image input from the
11:37:46	23	scanner be stored to disk in relation to the
11:37:51	24	generation of a reduced size version of that

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Time	Line	Text
11:37:55	1	image in the Scan/Reco station of the Hell
11:37:58	2	Chromacom system?
11:38:00	3	MR. HIRSCH: Objection. Vague.
11:38:03	4	A. The full size image was first going
11:38:08	5	into the random access memory of the size
11:38:10	6	reducer, there the reduced size image was
11:38:16	7	generated, and then those were stored on disk.
11:38:19	8	So afterwards, after the reduced size image was
11:38:23	9	generated it was stored on disk, both full size
11:38:29	10	and reduced size.
11:38:29	11	BY MR. SCHOENHARD:
11:38:29	12	Q. And is there any disclosure of that in
11:38:32	13	the documents on which you relied in forming
11:38:35	14	your opinions in this case?
11:38:35	15	MR. HIRSCH: Objection.
11:38:36	16	Wait for me to have a chance to
11:38:37	17	object.
11:38:38	18	A. I think again that's a level of
11:38:42	19	detail, technical detail which was not disclosed
11:38:45	20	in documents.
11:38:46	21	BY MR. SCHOENHARD:
11:38:51	22	Q. Returning your attention to paragraph
11:38:53	23	46 on page sixteen of your expert report, do you
11:38:57	24	see the sentence that reads "the full size image

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| 12:05:14 | 1 | BY MR. SCHOENHARD: |

12:05:14 2   Q.   Please direct your attention to

12:05:16 3 paragraph 47 on page seventeen of your expert

12:05:19 4 report.

12:05:20 5   Do you see that paragraph?

12:05:22 6   A.   Yes, I see this.

12:05:23 7   Q.   What do you mean by "full size images

12:05:27 8 could also be stored on disk at the Combiskop

12:05:30 9 station"?

12:05:36 10   A.   By this I mean that at the Combiskop

12:05:41 11 station there were stored full size images on

12:05:48 12 disk to work with for page make-up.

12:05:52 13   Q.   Those full size images would have been

12:05:55 14 stored to disk at the Scan/Reco station of the

12:05:59 15 Hell Chromacom system, correct?

12:06:01 16   A.   That is correct, yes.

12:06:05 17   Q.   Please direct your attention to

12:06:10 18 paragraph 48 on page seventeen of your expert

12:06:12 19 report.

12:06:13 20   Do you see that paragraph?

12:06:14 21   A.   Yes, I see that.

12:06:15 22   Q.   What do you mean by "the operator of

12:06:20 23 the Chromacom could, at his option, generate a

12:06:24 24 reduced size version of the input full size

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12:06:28	1	image"?
12:06:39	2	A. He could choose, by issuing to the
12:06:43	3	Combiskop station an appropriate command, he
12:06:47	4	could select to generate a reduced size image of
12:06:53	5	input -- full size image that was on the disk of
12:06:55	6	the Combiskop.
12:07:01	7	Q. From what would that reduced size
12:07:06	8	image be generated?
12:07:08	9	MR. HIRSCH: Objection.
12:07:13	10	A. It would be generated from the full
12:07:14	11	size image that was on the disk at the
12:07:17	12	Combiskop.
12:07:18	13	BY MR. SCHOENHARD:
12:07:19	14	Q. How could the operator of the
12:07:21	15	Combiskop station perform this function?
12:07:28	16	MR. HIRSCH: Objection.
12:07:30	17	A. He would type in an image number,
12:07:37	18	and a command first, of course, and a scale
12:07:39	19	factor, at what scale he wanted to size it down.
12:07:42	20	BY MR. SCHOENHARD:
12:07:55	21	Q. What would happen then?
12:08:00	22	MR. HIRSCH: Objection. Vague.
12:08:02	23	A. The mini-computer would, of the
12:08:07	24	Combiskop, would retrieve the image from disk

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12:08:12	1	and would generate the reduced size image, and
12:08:16	2	then transfer it back on disk, or into the --
12:08:21	3	onto the image memory to show it to the
12:08:24	4	operator.
12:08:29	5	BY MR. SCHOENHARD:
12:08:29	6	Q. Would that size reduction process
12:08:30	7	happen immediately upon the operator of the
12:08:33	8	Combiskop station typing in an image number and
12:08:35	9	a skill factor?
12:08:37	10	MR. HIRSCH: Objection. Vague.
12:08:38	11	A. It would immediately start then and
12:08:42	12	take some time, of course, and then he would see
12:08:46	13	it on the monitor.
12:09:09	14	(Whereupon, Preuss Exhibit 10 was
12:09:26	15	marked for identification.)
12:09:26	16	BY MR. SCHOENHARD:
12:09:27	17	Q. You are being handed now what has been
12:09:29	18	marked Preuss Exhibit 10. Do you recognize this
12:09:34	19	document?
12:09:37	20	(Witness reviewing document.)
12:09:46	21	A. Yes, I do recognize this.
12:09:48	22	BY MR. SCHOENHARD:
12:09:52	23	Q. Please direct your attention to the
12:09:54	24	page bearing production number EKC005020123.

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12:10:05	1	A. Yes.
12:10:06	2	Q. Do you see that page?
12:10:06	3	A. Yes, I see this.
12:10:07	4	Q. Near the bottom of this page do you
12:10:11	5	see the paragraph that begins "functions to be
12:10:12	6	added to the Combiskop in the future will --"
12:10:15	7	A. Excuse me, I'm on the wrong page. 123
12:10:19	8	you said?
12:10:19	9	Q. Yes. Page EKC005020123.
12:10:30	10	A. I was on the wrong page. I was on
12:10:30	11	103.
12:10:30	12	Yes, I have it.
12:10:31	13	Q. Near the bottom of that page do you
12:10:33	14	see the paragraph that begins "functions to be
12:10:35	15	added to the Combiskop in the future will
12:10:37	16	include"?
12:10:41	17	A. Yes.
12:10:43	18	Q. Do you see the second bullet point
12:10:45	19	which reads "reduction and enlargement of
12:10:47	20	images"?
12:10:48	21	A. Yes, I see this also.
12:10:51	22	Q. Does that statement indicate that as
12:10:58	23	of the time of the conference proceedings which
12:11:04	24	are marked as Exhibit 10 the functionality of

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12:11:10	1	reduction and enlargement of images at the
12:11:13	2	Combiskop was not included in the Hell Chromacom
12:11:16	3	system?
12:11:17	4	MR. HIRSCH: Objection.
12:11:19	5	A. At that time, that was October, 1979,
12:11:22	6	it was not included, it was not yet ready. And
12:11:27	7	I know it also from my recollection from that
12:11:30	8	time. That was just a year after we had first
12:11:35	9	shown it in the GEC exhibition in Milan.
12:11:42	10	BY MR. SCHOENHARD:
12:11:42	11	Q. Which exhibition?
12:11:44	12	A. GEC.
12:11:45	13	Q. Thank you.
12:11:50	14	Was that functionality implemented at
12:11:52	15	a later time?
12:11:53	16	MR. HIRSCH: Objection.
12:11:55	17	A. Yes, I think so.
12:11:58	18	BY MR. SCHOENHARD:
12:12:01	19	Q. When?
12:12:01	20	A. I don't remember when exactly.
12:12:12	21	Q. Please direct your attention to
12:12:13	22	paragraph 50 on pages seventeen to eighteen of
12:12:17	23	your expert report.
12:12:20	24	Do you see that paragraph?

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12:14:39	1	paragraph do you see the language "the reduced
12:14:41	2	resolution requirements for the color monitor
12:14:45	3	(512 by 512 picture elements) allow a one-eighth
12:14:49	4	transfer of image data to image memory without
12:14:51	5	degradation of the color monitor display"?
12:14:56	6	A. I see this.
12:15:06	7	Q. Are you aware of any disclosure in
12:15:09	8	this document of the existence of a coarse
12:15:15	9	resolution image automatically generated at the
12:15:19	10	Scan/Reco station that could be recalled at the
12:15:22	11	Combiskop station?
12:15:27	12	MR. HIRSCH: Objection.
12:15:44	13	A. I don't recall where there's any
12:15:47	14	description of this, but I know that it was
12:15:50	15	available.
12:15:52	16	No, this was '79, October, '79. Maybe
12:15:56	17	we were still working on this, size reducer I
12:16:02	18	mean. It's possible that we were still working
12:16:04	19	on it.
12:16:05	20	BY MR. SCHOENHARD:
12:16:05	21	Q. Do you know --
12:16:06	22	A. So that in '79 maybe it was not yet
12:16:09	23	there.
12:16:10	24	Q. Do you know when the size reducer

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12:16:14	1	would have been available in the Scan/Reco
12:16:17	2	station of the Hell Chromacom system?
12:16:21	3	A. Definitely when it was first sold, and
12:16:24	4	that was 1980.
12:16:32	5	Q. Are you aware of any disclosure in the
12:16:34	6	documents on which you rely in forming your
12:16:36	7	opinion in this case of size reduction
12:16:40	8	capability in the Scan/Reco station of the Hell
12:16:44	9	Chromacom system in 1980?
12:16:46	10	MR. HIRSCH: Objection.
12:16:46	11	A. I don't specifically recall this,
12:16:55	12	aware of this described in the documentation.
12:16:58	13	BY MR. SCHOENHARD:
12:17:12	14	Q. Please direct your attention to
12:17:14	15	paragraph 53 on pages eighteen to nineteen of
12:17:17	16	your expert report.
12:17:22	17	Do you see that paragraph?
12:17:23	18	A. Yes.
12:17:24	19	Q. What do you mean by "after editing was
12:17:27	20	complete, the Chromacom applied those edits to
12:17:30	21	the full size image"?
12:17:32	22	MR. HIRSCH: Which paragraph are you
12:17:33	23	reading from, Paul?
12:17:34	24	MR. SCHOENHARD: Paragraph 53 that

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12:25:36	1	A. I think I said this before, the
12:25:39	2	operator could choose whether to use those or
12:25:44	3	the others which were generated at the Scan/Reco
12:25:47	4	station. Typically he would use the reduced
12:25:56	5	size images generated at the Scan/Reco station,
12:26:03	6	that other -- as I said, when there was an error
12:26:05	7	with such an image then he would use the other
12:26:07	8	one.
12:26:11	9	BY MR. SCHOENHARD:
12:26:18	10	Q. Please direct your attention to
12:26:20	11	paragraph 57 on page 20 of your expert report.
12:26:26	12	Do you see that paragraph?
12:26:27	13	A. Yes.
12:26:28	14	Q. Do you see the sentence that reads
12:26:40	15	"after the reduced size image was generated at
12:26:43	16	the Combiskop station of the Chromacom, it could
12:26:47	17	be stored either to disk or an image memory"?
12:27:01	18	A. Yes, I see that.
12:27:09	19	MR. SCHOENHARD: I'm going to mark as
12:27:11	20	Preuss Exhibit 11 a document bearing production
12:27:14	21	numbers EKC005020087 through EKC005020098.
12:27:24	22	(Whereupon, Preuss Exhibit 11 was
12:27:33	23	marked for identification.)
12:27:33	24	BY MR. SCHOENHARD:

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Time	Line	
12:27:34	1	Q. Do you recognize this document?
12:27:46	2	A. Yes, I recognize this.
12:27:48	3	Q. Turning your attention to the page
12:27:52	4	bearing production number EKC005020097, does
12:28:05	5	this page support your assertion that the
12:28:08	6	reduced size image generated at the Combiskop
12:28:11	7	station at the Chromacom could be stored to
12:28:20	8	disk?
12:28:20	9	MR. HIRSCH: Take your time with the
12:28:21	10	document.
12:28:26	11	(Witness reviewing document.)
12:29:27	12	A. No, I can't find any reference of this
12:29:30	13	here on this page that reduced size images
12:29:35	14	generated at the Combiskop would be stored on
12:29:38	15	this. But they were, I know they were.
12:29:52	16	(Whereupon, Preuss Exhibit 12 was
12:29:57	17	marked for identification.)
12:29:57	18	A. Also this date, I should mention this
12:30:00	19	perhaps, '79 again, this document, and at that
12:30:07	20	time this Chromacom was under full development
12:30:11	21	and not yet fully operational, so I cannot say
12:30:13	22	for sure whether all the functions we talk about
12:30:16	23	and which I made my opinion on would have been
12:30:19	24	available already in the year '79. Several

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12:30:28	1	functions could have been available also in 1980
12:30:32	2	when it was first sold.
12:30:35	3	BY MR. SCHOENHARD:
12:30:38	4	Q. In front of you you'll find a document
12:30:39	5	which has been marked Preuss Exhibit 12 with two
12:30:44	6	pages bearing production numbers EKC005020742
12:30:50	7	and EKC005020776.
12:30:56	8	A. Yes, I see it.
12:30:58	9	MR. HIRSCH: Again for the record this
12:31:00	10	is -- looks like one page of an article or a
12:31:04	11	presentation, not the full document.
12:31:10	12	BY MR. SCHOENHARD:
12:31:10	13	Q. Referring to the second page of this
12:31:12	14	exhibit bearing production number EKC005020776,
12:31:19	15	on this page do you find any disclosure in
12:31:22	16	support of your assertion that a reduced size
12:31:25	17	image generated at the Combiskop station of the
12:31:28	18	Chromacom could be stored to disk?
12:31:52	19	(Witness reviewing document.)
12:32:22	20	A. Most of this on the page is not on the
12:32:25	21	Chromacom, it is on a different system, HDP,
12:32:28	22	Helio Data Processing, which was used for
12:32:38	23	gravure printing.
12:32:38	24	But here in the first column, second

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12:32:42	1	paragraph it is said "once you have finished
12:32:53	2	processing a page with individual color
12:32:55	3	corrections and all other layout requirements, a
12:32:58	4	finalized page command to the computer transfers
12:33:00	5	the stored single picture data plus the
12:33:04	6	subsequent processing, positioning, and
12:33:05	7	correction data to the completed page magnetic
12:33:08	8	disk memory."
12:33:09	9	This could be interpreted, and I
12:33:12	10	interpret it like this, that the individual
12:33:15	11	images were stored back on disk once -- after
12:33:19	12	they have been edited. But it's not clear
12:33:22	13	whether it's the Combiskop reduced size image or
12:33:26	14	the Scan/Reco reduced size image.
12:33:47	15	BY MR. SCHOENHARD:
12:33:47	16	Q. Please direct your attention to
12:33:48	17	paragraph 59 on page 21 of your expert report.
12:33:52	18	Do you see that paragraph?
12:33:53	19	A. Yes.
12:34:01	20	Q. What is the basis for your assertion
12:34:03	21	that the operator of the Hell Chromacom system
12:34:06	22	could select to transfer multiple reduced size
12:34:09	23	images from disk to an image memory?
12:34:19	24	A. That is -- I know for sure that he can

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12:46:25	1	Someone also here writes "generally," I don't
12:46:28	2	know why, but I don't agree, and I stick to what
12:46:31	3	I said before.
12:46:33	4	BY MR. SCHOENHARD:
12:46:35	5	Q. Referring again to paragraph 61 on
12:46:37	6	page 22 of your expert report, and your
12:46:43	7	assertion that "one image memory could store the
12:46:46	8	full size image while the other image memory
12:46:49	9	stored the reduced size image," am I --
12:46:54	10	A. Yes.
12:46:54	11	Q. -- am I correct that prior to any
12:46:57	12	simultaneous storage of any portion of a full
12:47:00	13	size image and reduced size image, the image
12:47:04	14	memories of the Combiskop station, at least the
12:47:06	15	full size image would have been stored to disk?
12:47:09	16	MR. HIRSCH: Objection.
12:47:14	17	A. Excuse me, that was too complicated.
12:47:15	18	I didn't get that, what you meant.
12:47:17	19	BY MR. SCHOENHARD:
12:47:18	20	Q. Am I correct that the full size image
12:47:23	21	would be stored to disk prior to any
12:47:27	22	simultaneous storage of at least a portion of
12:47:31	23	that full size image and reduced size image in
12:47:37	24	the image memories of the Combiskop station?

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12:47:44	1	MR. HIRSCH: Objection.
12:47:45	2	A. The full size image would be first on
12:47:48	3	disk, but I don't agree with this in your
12:47:52	4	question "at least a portion."
12:47:57	5	I say in my opinion that full size
12:47:58	6	image could be stored simultaneously with a
12:48:02	7	reduced size image.
12:48:05	8	MR. HIRSCH: Paul, are we getting to a
12:48:07	9	place we can break for lunch?
12:48:10	10	MR. SCHOENHARD: About four more
12:48:14	11	questions, if you wouldn't mind.
12:48:14	12	BY MR. SCHOENHARD:
12:48:15	13	Q. Are you doing okay, Dr. Preuss?
12:48:17	14	A. I'm doing okay, yes.
12:48:20	15	MR. HIRSCH: Go ahead.
12:48:20	16	BY MR. SCHOENHARD:
12:48:28	17	Q. Just to clarify, you did say, though,
12:48:32	18	that the full size image would be stored to disk
12:48:35	19	first, am I correct?
12:48:38	20	MR. HIRSCH: Objection.
12:48:40	21	A. It would have to be on disk, yes.
12:48:43	22	BY MR. SCHOENHARD:
12:48:43	23	Q. Please direct your attention to
12:48:45	24	paragraph 62 on page 22 of your expert report.

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14:27:58	1	image could be loaded in image memory one and
14:28:00	2	reduced size image in memory two.
14:28:20	3	BY MR. SCHOENHARD:
14:28:20	4	Q. In formulating your opinions of the
14:28:22	5	asserted claims of the '121 patent in light of
14:28:25	6	the Scitex Response-300 system in this case, did
14:28:28	7	you perform an analysis on a physical Scitex
14:28:30	8	Response-300 system?
14:28:33	9	MR. HIRSCH: Objection.
14:28:34	10	A. No, I did not. It would be difficult
14:28:45	11	to find one now.
14:28:46	12	BY MR. SCHOENHARD:
14:28:46	13	Q. Please turn your attention to
14:28:48	14	paragraph 75 on page 26 of your expert report.
14:28:55	15	Do you see that paragraph?
14:28:56	16	A. Yes.
14:28:56	17	Q. What do you mean by "the Response-300
14:28:59	18	received images from a scanner that was
14:29:01	19	physically outside of the system"?
14:29:11	20	A. That sentence refers to a scanner that
14:29:17	21	was not sold together with the Response-300
14:29:21	22	system, since Scitex didn't manufacture a
14:29:26	23	scanner at that time, so they had to rely on
14:29:29	24	scanners of other manufacturers and had to

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14:32:09	1	A. That's not correct. They are stored
14:32:11	2	in the Response-300 system on a disk.
14:32:14	3	BY MR. SCHOENHARD:
14:32:17	4	Q. Would full size images first be stored
14:32:19	5	to disk outside of the Scitex Response-300
14:32:21	6	system rather than the disk brought into the
14:32:25	7	system?
14:32:25	8	MR. HIRSCH: Objection.
14:32:28	9	A. No. The full size images coming from
14:32:32	10	the scanner would be stored when they come into
14:32:37	11	the system on the disk in the system.
14:32:41	12	BY MR. SCHOENHARD:
14:32:43	13	Q. Could you please explain to me in more
14:32:45	14	detail how that process would work?
14:32:46	15	A. The full size images would come in
14:32:53	16	through the interface to the scanner that was
14:32:57	17	provided by Scitex, and then they are stored by
14:33:01	18	one of the mini-computers onto one of the disks
14:33:06	19	that was in this Scitex Response-300 system.
14:33:11	20	Q. Would a reduced size image be
14:33:14	21	generated prior to the storage of a scanned full
14:33:19	22	size image to disk?
14:33:20	23	A. In the Response-300, reduced size
14:33:29	24	images were not generated prior to storage of

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14:33:32	1	the full size images onto disk.
14:33:36	2	Q. Please direct your attention to
14:33:39	3	paragraph 76 on page 26 of your expert report.
14:33:43	4	Do you see that paragraph?
14:33:44	5	A. Yes.
14:33:47	6	Q. In your consideration of the Scitex
14:33:49	7	Response-300 system as applied to the asserted
14:33:52	8	claims of the '121 patent, are you applying the
14:33:56	9	same definition of the term "video" you set
14:33:58	10	forth in paragraph 39 on page fourteen of your
14:34:00	11	expert report?
14:34:09	12	A. Yes, I would apply the same definition
14:34:22	13	here also, same definition of video as explained
14:34:26	14	in paragraph 39, yes.
14:34:28	15	Q. Under the definition of the term video
14:34:32	16	set forth in paragraph 39 on page fourteen of
14:34:34	17	your expert report, do you have an opinion as to
14:34:37	18	whether the Scitex Response-300 system operated
14:34:40	19	with video images, video data and video pixel
14:34:44	20	data?
14:34:45	21	A. I have the opinion, and I know that it
14:34:48	22	did not, in the time frame of up to April, 1982,
14:34:54	23	up to that time it did not operate with video
14:34:56	24	images and video image data.

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14:34:58	1	Q. Please direct your attention to
14:35:02	2	paragraph 79 on page 27 of your expert report.
14:35:08	3	A. Yes, I have it.
14:35:09	4	Q. Do you see that paragraph?
14:35:10	5	A. Yes.
14:35:10	6	Q. The last sentence reads "the
14:35:14	7	multi-layered memory had an input port and a
14:35:16	8	separate output port."
14:35:18	9	What do you mean by that?
14:35:19	10	A. The multi-layered memory was the image
14:35:25	11	memory in the Imager console, and it had
14:35:30	12	separate input and output ports, exactly like in
14:35:38	13	our Chromacom system the image memory had.
14:35:41	14	Q. Would you say that the multi-layered
14:35:45	15	memory in the Scitex Response-300 system was
14:35:48	16	dual ported?
14:35:50	17	MR. HIRSCH: Objection.
14:35:51	18	A. It had a separate input and output
14:35:57	19	port, I can only say that.
14:35:59	20	BY MR. SCHOENHARD:
14:36:03	21	Q. Did the multi-layered memory in the
14:36:04	22	Scitex Response-300 system have separate input
14:36:07	23	and output ports with physically separate pins?
14:36:11	24	MR. HIRSCH: Objection.

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14:36:12	1	A. This I can't -- I've not designed the
14:36:21	2	system. I only know there were separate input
14:36:24	3	and output ports for the multi-layered memory
14:36:28	4	which could be concluded from watching the
14:36:30	5	system and the speed at which images were
14:36:33	6	loaded.
14:36:34	7	BY MR. SCHOENHARD:
14:36:35	8	Q. Are you aware, are you aware of any
14:36:36	9	documents on which you relied in formulating
14:36:39	10	your opinions in this case that disclose whether
14:36:42	11	the multi-layered memory in the Scitex
14:36:44	12	Response-300 system had separate input and
14:36:47	13	output ports with physically separate pins?
14:36:50	14	MR. HIRSCH: Objection.
14:36:53	15	A. I don't rely on any documents
14:37:05	16	disclosing that the multi-layered memory had a
14:37:08	17	separate input and output port in its
14:37:10	18	multi-layered memory. I concluded it from
14:37:14	19	watching the system, as I said before, and I was
14:37:17	20	very sure -- I am still very sure that it is
14:37:22	21	exactly like this.
14:37:23	22	BY MR. SCHOENHARD:
14:37:23	23	Q. Do you know whether the random access
14:37:26	24	memory associated with the multiple computers of

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15:33:37	1	using the zooming function?
15:33:51	2	MR. HIRSCH: Objection.
15:33:53	3	A. It could refer to both, zooming and
15:33:55	4	scaling, but was one of those functions the
15:34:00	5	reduced size images used for page make-up were
15:34:04	6	generated, and in cases the operator
15:34:09	7	deliberately wanted to generate a reduced size
15:34:15	8	image, and then all the edits were repeated back
15:34:21	9	to full detail.
15:34:24	10	BY MR. SCHOENHARD:
15:34:24	11	Q. Please direct your attention to
15:34:26	12	paragraph 91 on page 31 of your expert report.
15:34:32	13	Do you see that paragraph?
15:34:34	14	A. 91. Yes.
15:34:46	15	Q. Is there any disclosure in the
15:34:51	16	documents on which you rely in formulating your
15:34:54	17	opinions with respect to the Scitex Response-300
15:35:00	18	system as applied to the asserted claims of the
15:35:03	19	'121 patent about the direct transfer from
15:35:06	20	random access memory to size reducer and from
15:35:08	21	size reducer to random access memory as you've
15:35:11	22	discussed in paragraph 91?
15:35:13	23	MR. HIRSCH: Objection.
15:35:25	24	A. I don't recall whether it's somewhere

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15:35:26	1	in the documents. No documents -- I have not
15:35:28	2	cited any documents here. The direct transfer
15:35:34	3	of the full size image from the random access
15:35:36	4	memory to the size reducer and back, and the
15:35:45	5	reduced size image back was done when the
15:35:50	6	mini-computer of the Scitex Response-300
15:35:56	7	generated a reduced size image. Yes, of course,
15:36:05	8	for example when it was done either by the
15:36:11	9	operator or automatically.
15:36:15	10	BY MR. SCHOENHARD:
15:36:15	11	Q. But sitting here today you are not
15:36:17	12	aware of any disclosure in the documents on
15:36:19	13	which you've relied in forming your opinions of
15:36:22	14	this feature?
15:36:23	15	MR. HIRSCH: Objection.
15:36:26	16	A. I concluded from the operation that I
15:36:52	17	know how this system worked. When, for example,
15:37:01	18	the reduced size image had to be generated from
15:37:04	19	the full size image and, for example, the full
15:37:06	20	size image was not big enough to fit in the
15:37:10	21	image memory, then it would have to be taken
15:37:14	22	from the disk and into the random access memory
15:37:18	23	of the computer, and would have to be reduced
15:37:23	24	size there. I mean it could not have been taken

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15:37:30	1	from the image memory first, full size image
15:37:34	2	could not have been loaded in the image memory
15:37:35	3	and size reduced from there because it wouldn't
15:37:36	4	fit into the image memory.
15:37:42	5	BY MR. SCHOENHARD:
15:37:42	6	Q. But is there any disclosure of this
15:37:44	7	direct transfer in the documents on which you
15:37:46	8	relied?
15:37:46	9	MR. HIRSCH: Objection. Asked and
15:37:47	10	answered.
15:37:48	11	A. I currently can't recollect whether
15:37:57	12	it's all there, it might be disclosed.
15:38:01	13	BY MR. SCHOENHARD:
15:38:01	14	Q. Please direct your attention to
15:38:02	15	paragraph 92 on page 31 of your expert report.
15:38:06	16	Do you see that paragraph?
15:38:07	17	A. Yes, I see.
15:38:08	18	Q. Do you see the sentence which reads
15:38:11	19	"at any time, the operator could transfer the
15:38:13	20	reduced size version of the full size image to
15:38:16	21	disk for storage"?
15:38:18	22	A. Yes, I see that.
15:38:22	23	Q. Are you aware of any disclosure in the
15:38:24	24	documents on which you rely in forming your

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15:44:42	1	A. No, I don't recall this specifically
15:44:45	2	from the file history.
15:44:46	3	BY MR. SCHOENHARD:
15:44:49	4	Q. Returning again to paragraph 93 of
15:44:51	5	your expert report on page 31, and our
15:44:56	6	discussion of the operator of the Response-300
15:45:02	7	selecting to transfer multiple reduced size
15:45:05	8	images from disk to the multi-layered memory.
15:45:09	9	A. Yes.
15:45:09	10	Q. I believe you stated that you did not
15:45:15	11	think it was necessary to identify more than one
15:45:20	12	method in which that could be done in one
15:45:23	13	operation?
15:45:26	14	A. Yes.
15:45:27	15	Q. Are you aware of any other method in
15:45:32	16	which that could be done aside from the creation
15:45:36	17	of an assembly, storage of that assembly and
15:45:39	18	recalling of the pre-made assembly to RAM?
15:45:42	19	MR. HIRSCH: Objection. Asked and
15:45:45	20	answered.
15:45:46	21	A. With respect to the Scitex systems you
15:45:48	22	mean?
15:45:48	23	BY MR. SCHOENHARD:
15:45:49	24	Q. Yes.

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15:45:54	1	A. I don't recall that I know of any
15:46:00	2	other method in the Scitex system to do it in
15:46:03	3	one operation.
15:46:03	4	Q. Please direct your attention to
15:46:05	5	paragraph 94 of your expert report on page 32.
15:46:08	6	Do you see that paragraph?
15:46:09	7	A. Yes, I see this.
15:46:13	8	Q. Do you see the sentence which reads
15:46:16	9	"when the Response-300 transferred an image from
15:46:18	10	disk to the multi-layered memory for display or
15:46:21	11	additional manipulation, the image was
15:46:23	12	transferred directly from disk to the random
15:46:26	13	access memory associated with the computer and
15:46:28	14	then could be transferred to the multi-layered
15:46:30	15	memory"?
15:46:31	16	A. Yes, I see that.
15:46:32	17	Q. Could you please explain in greater
15:46:36	18	detail how that direct transfer was accomplished
15:46:39	19	in the Scitex Response-300 system?
15:46:41	20	A. It was reading from the disk to the
15:46:48	21	random access memory in the computer just the
15:46:53	22	conventional way as all the computers worked at
15:46:56	23	that time, and that was a direct transfer.
15:47:00	24	Q. Are you aware of any disclosure of

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EXHIBIT 10

AN UPDATE ON LASER IMAGING
FOR THE
GRAPHIC ARTS

S. Thomas Dunn, Ph.D*

Abstract: 1982 can be said to be a pivotal year in the evolution of electronic prepress. Many incremental steps were taken since the 1981 TAGA conference that are each directed at the total automation of the prepress production area. During the preceding 12 months, many companies either made new decisions for laser based imaging systems or reinforced previous commitments to laser based imaging. Every day it becomes more apparent that the laser as a digital imaging tool will dominate the progress in electronic prepress, at least for this decade.

The importance of laser imaging to electronic publishing of text, line art, and pictures is now generally accepted. This presentation will provide an overview of the significant developments since the 1981 TAGA meeting, as well as projections for the progress and direction of future developments in laser imaging systems. Topic areas will range from newspaper plate-making to process color imaging.

Introduction

During the past year, new and major commitments to laser imaging were made by DS, PDI, Eikonix, Crosfield and HCM. Interesting is that all of these products are high quality color imaging systems. Most of the lasers are in the blue/green region of the Argon laser, with some initial work on HeCd.

Also, during the year, we have seen the evolution of the split-apart color scanner for independent input and output.

*President, Dunn Technology, Inc.

Further, the Kodak and Agfa-Gevaert acquisitions of Atex and Compugraphics respectively, have placed the consumables suppliers squarely in the electronic pre-press area. With Hoechst (EOCOM), 3M (Autologic joint venture and Comtal), this leaves only duPont (of the large suppliers) in the USA without an electronic hardware prepress venture. Chemco is rumored to be close to making a deal with Dow Jones for their laser platemaker and Polychrome (Dainippon Ink and Chemicals) and Fuji Photo do not appear to have ventures ongoing in electronic prepress, although both are very active in laser compatible materials.

On another front, the electronic page make-up suppliers are, in general, getting into the typesetting business, while at least one of the laser platemaking (facsimile) suppliers is also trying to get into the typesetting business. Thus a field already in trouble (typesetting) faces entries by 6 to 10 new competitors.

Since the last TAGA meeting, low resolution type-setting has begun to penetrate certain printing markets as well as provide useful low cost proofs. These devices are, in general, based on laser imaging.

Thus, from color separations, to typesetting, to platemaking, to proofing, the laser, as a digital imaging device, is finding wide spread acceptance.

Platemaking and Facsimile

Over the past decade, newspapers have been trying to use various laser scanning techniques (Reference 1) to scan paste-ups at one facility and image printing plates at a remote printing plant. The dominant effort has been to use Argon UV lasers and modified Diazo and Pholopolymer chemistries. In 1974, these chemistries typically had a sensitivity of greater than 50 milli-jouels per square centimeter, while the laser scanners being developed delivered about 5-10 millijou'es per square centimeter. As plate manufacturers improved the sensitivity of their printing plate coatings, the resultant press life (run length) and shelf life (after coating) did not meet the requirements of the medium to large size newspapers. Some 10 newspapers in the US and Canada have attempted to transmit to UV receivers

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Imaging printing plates .   Only three of these newspapers are still attempting this at this time, and the current results are not all that encouraging. Problems remain in press life (approximately 50,000 impressions), shelf life (hours to days) and in reliability and maintainability of the UV laser tube (rebuild after 500 to 1500 hours).

In the same vein, the standalone UV platemakers have had similar problems.   Two medium size U.S. newspapers are continuing with standalone UV platemakers; here the main problem is laser tube life (since press run lengths are shorter).

During 1981, one large U.S. newspaper committed to electrophotographic printing plates at the receive site, and The Wall Street Journal has an 8 year old development program with electrophotographic printing plates at the receive site. Between these two efforts, there are some 18 receiver units installed in this mode of operation.   The main advantage of this approach is the use of low power, visible (blue/green) lines of the Argon laser (same laser as used in color scanners) resulting in excellent laser performance.   The main disadvantage of this approach is the cost of the photo-conductive printing plates, which are 2 to 3 times as expensive as conventional newspaper wipe-on UV Diazo based printing plates.

However, it is our projection that electrophoto-graphic platemaking will be the dominant direction for future facsimile and CPU-to-Plate applications for newspapers (Reference 2).

Already there are a variety of vendors providing (developing) electrophotographically based platemaking systems (Figure 1).

Toner Use	Company	Type of Plate	Type of Intermediate	System	Status
Photo Mask	Nippon Paint/NAPP	Relief	Reusable	Camera	Dev.
Etchant Mask	Fuji Chemical	Coated Offset	Reusable	Camera	Dev.
Etchant Mask	Konishiroku	? Offset	?	?	Dev.
Etchant Mask	Chemco	Presensitized Offset	None	Camera	Field Trials
Etchant Mask	Chemco/Dow Jones	Presensitized Offset	None	Laser	Installed
?	Howson Algraphy	?	?	?	Dev.
Etchant Mask	Azoplates Elfasol	Presensitized Offset	None	Camera	Installed
Etchant Mask	EOCOM/Muirhead; Elfasol	Presensitized Offset	None	Laser	Installed
Etchant Mask	Mitrok	Presensitized Offset	None	Camera	Field Trials
Etchant Mask	Polychrome	Presensitized Offset	None	Camera	Dev.
Print With	3M - Pyrofax	Toner on Aluminum	Partly Reusable/Reclaimable	Camera	Mature
Print With	Agfa-Gevaert	Toner on Aluminum	Reuseable	Camera	Field Trials

Figure 1: Electrophotographic Developments for Newspaper Printing Plates

5

From Figure 1 it is important to take notice of those systems that utilized reusable intermediates and toner on aluminum for printing. These systems are limited to 3M-Pyrofax and the recently announced Agfa-Gevaert Electroplater. In fact, the Electroplater goes the furthest in providing the requisite overall lowest cost approach. This statement of cost effectiveness depends on the actual rental charge made by Agfa as well as the charge made for each image. Agfa does not currently plan to sell the hardware.

Figure 2 is a block diagram of the Electroplater. Without going into full detail here,

3:   Is copy board

2:   is camera lens

1:   reusable photo conductor

4-5-6-7-18-17-16: Is the path of the photo conductor running on air bearing slides where it is charged, cleaned etc. in the return direction, and toned, cleaned, and off contact transfer of toner to wipe-on offset aluminum at the top drum 8 in the forward direction.

13: is facilities for 3 different size plates (up to

25 x 36 image area)

14-15-8-9-10-12-11: is the progress of the aluminum plate which is toned, fused, gummed and dispensed.

6
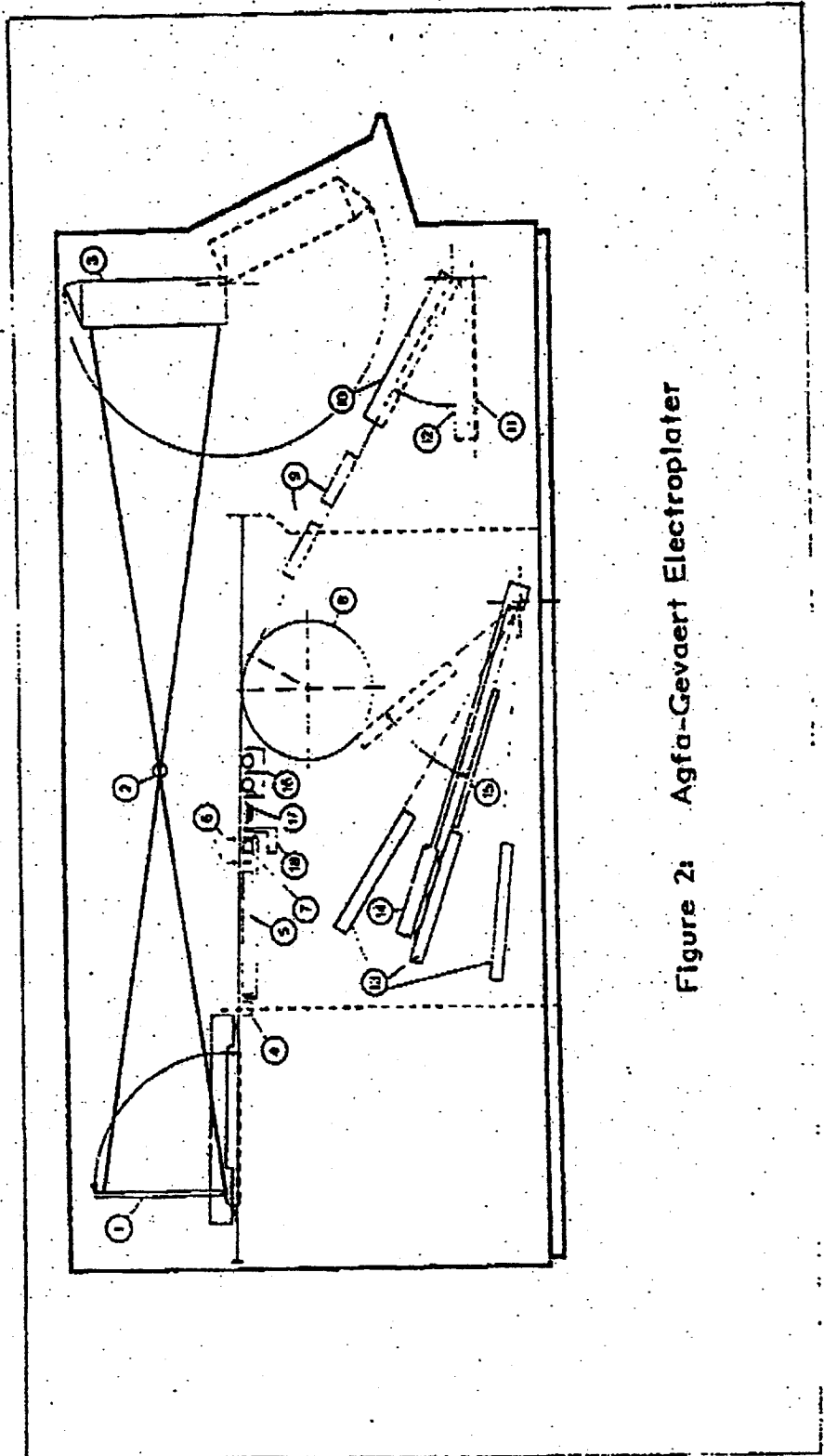
Figure 2:   Agfa-Gevaert Electroplater

Thus, with the Electroplater, one should approach wipe-on offset printing plate costs, and with a stated throughput of 200 printing plates per hour, this system should prove viable for medium to large size newspapers. It should be noted that all of the printing plates given in Figure 1 are sensitive to either the Argon, HeCd or HeNe low power (cost) lasers. Further, it is probable that several of these photoconductors can readily be sensitized for use with short wavelength semiconductor lasers.

Two thermal technologies exist that may compete favorably with the electrophotographic techniques (Figure 3).

Technology	Type of Plate	Type of Intermediate	System	Status
Chromium Dioxide	Offset	Reusable	Laser	?
Lasermask	Offset	Non-Reusable	Laser	Installed

Figure 3: Thermal Technologies for Newspaper Printing Plates

In the Chromium Dioxide system, the Chromium Dioxide is reusable, as with the photoconductor in the Electroplater. This technology is currently in use for the production of printed circuit boards. Magnetic charge is used to transfer toner to the aluminum printing plate. Again plate prices with this technology could approach wipe-on offset pricing. The Lasermask® carries the toner on a plastic substrate; the toner is transferred by laser heating to the aluminum plate. With this technology, a lasermask is required for each printing plate to be made. It should be pointed out that the Lasermask® , after imaging leaves a plastic sheet which can then be used as a negative for conventional UV exposure of printing plates.

From Reference 2 we have projected system-to-typesetter facsimile as the means to optimize required bandwidth and achieve optimum quality at reduced commu-

®LogEscan Systems

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nications costs.   This remains true and is utilized by the national news magazines with their Triple-I systems.

However, newspapers are still precluded from this path due to lack of availability of the full page. In most cases, full page text is not available, and in the U.S. only one newspaper has digital news pictures available , and no one has found a satisfactory solution to the provided prescreened display advertisement.

One final issue concerns those laser imaging systems that go to plate-ready film; waiting for the correct solution to digital platemaking. Here, several products use the HeNe laser, while others use low power Argon and HeCd. The trade-offs are straight forward. Laser costs: the Argon is about twice the cost of the HeCd which in turn is some 6 times the cost of HeNe. On the other hand, red sensitive film is from 15 percent to 50 percent more expensive than equivalent blue/green sensitive film. This film pricing situation is probably not permanent, as red films do not appear to be substantially more expensive to manufacture. The current pricing differential more likely reflects limited competition and limited volume. One other difference between the two regions is that blue/green lasers deliver more power than the HeNe laser, and the films are typically more sensitive in the blue/green than in the red region.

Thus, one can expect to see Argon/HeCd lasers in the more expensive, higher productivity systems and HeNe lasers in lower cost, lower productivity systems.

Regarding laser platemaking and facsimile, the following Figures 4 through 9 provide information on the market and are self explanatory. (Note this does not cover the external drum facsimile provided by Muirhead, Rapicom, Matsushita, and NEC such as the Rapicom/Muirhead order with U.S. Today - Gannett's evolving national newspaper.)

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Customer	Senders	Receivers	Senders/Receivers	Application
New York Times (FL)			2	Facsimile
St. Paul	2	2		Facsimile
Gotesborgs Posten	1	1		Facsimile
Osaka Yamatoya			1	Demonstrator
Totals:	3	3	3 = 9	

Figure 4: Unit Orders for LogEscan - 1981

Customer	Senders	Receivers	Application
Baton Rouge	2	2	Facsimile/Film
Asbury Park	1	1	Facsimile/Film
La Prensa (Mexico)	1	1	Inplant/Film
Autologic	1		
New York Times (LIT) Management System for LogEscan			
Totals:	4	4 = 8	

Figure 5: Unit Orders for Muirhead - 1981

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Figure 5: Unit Orders for Muirhead – 1981

Customer	Senders	Receivers	Senders/Receivers	Application
Phoenix Gazette			4	Two Units to Film; Two Units to UV Plate; Facsimile
Reno			2	Inplant Facsimile to Plates
Toronto		4		Facsimile, Film
San Francisco		4	4	Facsimile, Film
Totals:	0		10 = 14	

Figure 6: Unit Orders for EOCOM – 1981

Company	U.S.A.	International	Total
EOCOM	10 (43%)	4 (44%)	14 (44%)
LogEscan	6 (26%)	3 (33%)	9 (28%)
Muirhead	7 (31%)	2 (23%)	9 (28%)
Totals:	23	9	32

Figure 7: Unit Orders – 1981

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Company	1978 US	Int'l	Total	1979 US	Int'l	Total	1980 US	Int'l	Total	1981 US	Int'l	Total	4 Year Total US	Int'l	Total
EOCOM	20	8	28	18	19	37	2	9	11	10	4	14	50	40	90
LogEscan	10	2	12	15	0	15	7	2	9	6	3	9	38	7	45
Muirhead	2	0	2	0	2	2	14	2	16	7	2	9	23	6	29
Totals:	32	10	42	33	21	54	23	13	36	23	9	32	111	53	164

Figure 8: Total Unit Orders - 1978-1981 (Exclusive of Dow Jones and Japan)

Company	Units	Customers
EOCOM	47 (44%)	13
LogEscan	41 (39%)	8
Muirhead	18 (17%)	4
Totals:	106	25

Figure 9: Market Share for U.S. Newspapers (March-1982)

At this time there are estimated to be some 193 systems, with the following major delineating characteristics (here the 10 units returned in 1981 (by our counting system) have been factored out):

- 80% for facsimile (up from 73% as of January 1, 1980):

    86 units with sending capability and 112 units with receiving capability (for a total of 155 units)

    49% of the exposures to film

    20% of the exposures to UV printing plates

    61% market share for EOCOM (down from 64%)

- 19% for non-facsimile (down from 27%):

    38% of these for UV exposure (down from 51%)

- 85% of systems ordered are estimated to be operational

What's the matter?

For the past 24 months we have been projecting the downturn in the market.

- In January of 1981 we projected 1981 to be the same as 1980, which came about.

- Further, EOCOM still does not have a satisfactory UV laser/printing plate combination for over 50,000 – 75,000 impressions.

- LogEscan has not made substantial inroads in the USA with the direct-to-plate version of the lasermask

- Muirhead's Chicago Tribune installation is only just coming online with the Elfasol plate.

The net sum of it is that the technology has become satisfactory for facsimile use (intra and inter-plant) to film.   1982 will likely follow the patterns

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of 1980 and 1981, with no significant inroads in stand-alone platemaking, or direct platemaking at the receive facsimile site.

Pagination with text, halftones, and line art in place, will be a new driving force for the technology, but this is not likely to occur in any substantial form before late 1983 and/or 1984.

The development of this pagination application is primarily paced by solutions to:

Picture Processing
Provided Display Ads

Color Scanning

In this market, developments are keeping pace with our 1980 projections (Reference 1). The trends are very clear and well focused around electronic color page make-up systems.

- Split-Apart Scanner: During the past year, Crosfield has evolved the 530/540 split scanner into the 640 series scanners to support their page make-up system. DS upgraded its split-apart scanner. HCM announced a standalone output record, Scitex upgraded its ELP output recorders to the ERAY output with 4 beams in place of the previous one-beam system to improve output speed.

- Electronic Halftone: Crosfield announced electronic halftones for 2 of 3 output recorders of the 640-series, DS announced electronic halftones (with 23 by 23 matrix) for its 708 and 808 scanners, and HCM brought out the DC350 electronic halftones at conventional angles.

- Argon Lasers: Following HCM's decade ago decision, Crosfield, Scitec, PDI and DS all now offer the Argon laser for output. The DS decision was a shift from HeNe, partly caused by the high red film prices discussed above.

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- **HeCd Lasers:** Eikonix is at least one (of several) of the color scanners manufacturers who are seriously evaluating the HeCd laser as a lower cost alternate to the Argon laser.

- **Laser:** With exception of Linotype Paul, all scanner manufacturers are including lasers and electronic dot generation in their premium scanners. Linotype Paul is rumored to be working on a contact screen Argon laser output.

- **Digital Color Proof:** HCM is to show a Direct Digital Color Proofing System at DRUPA. Here, 3 laser lines are used to image Kodak R-19, R-14, and other color papers. The output media for the Digital Color Proofer has not been announced. This $375,000 device will probably find its best use within the gravure industry, where no film is required in those electronic systems driving Helioklischographs or laser gravure. Crosfield and Scitex are rumored to be close behind HCM in digital color proofing. Look for a future trend to electrophotographic-based digital color proofing systems. One example is KC film, but others should surface.

- **Large Format Output:** HCM, Scitex, Crosfield, and DS now all have standalone output drum capacities to cope with at least an 8-page imposition, enabling the outputting of a fully plate-ready signature.

- **Flatfield:** The developing Eikonix technology is based on a flatfield input scanner using linear arrays.

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Page Make-up Color

The evolving color page make-up systems are also following the 1980 predictions (Reference 1).

In the 1980 TAGA proceedings, we projected the split-apart scanner and the evolution of many new components for use in optimizing the digital production of process color pages including text. As we move into DRUPA this year, we find many of the components falling into place. Just to review from 1980 (Reference 1), we repeat Figure 15 herein as Figure 10.

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Page and Signature
Source   Assembly   Printing

```
┌──────────────────────────────────────────────────────────┐
│   ┌─────┐   ┌─────┐                   ┌─────┐              │
│   │  1  │   │  4  │                   │  9  │   ┌─────┐    │
│   └─────┘   └─────┘       ┌─────┐     └─────┘   │ 12  │    │
│                          │  8  │              └─────┘      │
│   ┌─────┐   ┌─────┐      │     │     ┌─────┐   ┌─────┐     │
│   │  2  │   │  5  │      │     │     │ 10  │   │ 13  │     │
│   └─────┘   └─────┘      └─────┘     └─────┘   └─────┘     │
│   ┌─────┐   ┌───┐ ┌───┐              ┌─────┐              │
│   │  3  │   │ 6 │ │ 7 │              │ 11  │              │
│   └─────┘   └───┘ └───┘              └─────┘              │
└──────────────────────────────────────────────────────────┘
```
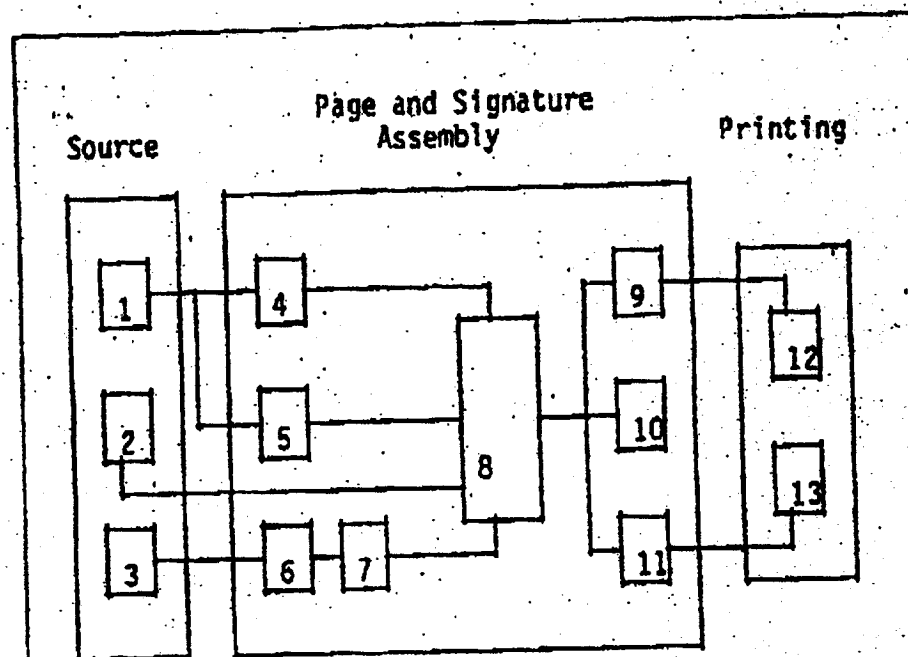
1. Original graphics
2. Page layout
3. Text composition
4. Large format drum scanner for pages 11x17"
5. High-speed flatbed scanners for pages 11x17"
6. Digital input of text composition
7. Font library and font generation interactive with No. 8 and providing text in bit map form
8. Page make-up terminal with soft proof
9. Large format output drum scanner, capable of film or intermediate and hard copy proof
10. High-speed flatbed scanner (11x17") for hard copy proofing
11. Digital or other storage media to allow printer to make litho plates in No. 13
12. Conventional platemaking with film
13. Platemaking from output of No. 11 or directly on-line if page make-up is at printers 11x17" flatbed stepping scanner, capable of imposing the elements of the signature on the required size plates.

Figure 10:   Components of the Future Commercial Electronic Publishing System

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- **Screen Resolution:** Crosfield is about to begin shipment of their 1024 x 1024 screen which should help in soft color proofing and is part of a basic systems strategy (see later). Scitex has upgraded to 512 x 384 and HCM is at 512 x 512.

- **Hardware Assist:** Scitex, with its new imager terminal, provides hardware assisted page composition calculations, thereby speeding up tasks such as rotation, sizing, and changing line screens. Crosfield, in its 860 system provides two levels of hardware assistance, one for the display files and an array processor for the page composition calculations. HCM provides hardware assistance for the display files.

- **Text:** We had previously projected viable text on these systems for 1983 (Reference 1). We continue to hold to that projection. Scitex is acquiring text from Bitstream (a Mergenthaler spin-off). Crosfield has a cooperation with III for text, and HCM already makes typesetters. Look for the beginings of viable text at DRUPA. However, most companies are underestimating the text problem and really viable text (with hyphenation/ justification, kerning, etc. on the system) will be delayed to 1983, or later. Look for a Scitex/Atex interface at DRUPA.

- **Viable Archiving:** The 6250 bits per inch, high speed tape recorders allow for viable archiving of production work in progress. A full 300 megabyte disk can be copied to tape in approximately 15 minutes (two tapes). HCM, Crosfield and Scitex are committed to this tape recorder.

- **New Entrants:** In addition to the initial three suppliers, PDI, DS, Eikonix and Coulter Information are at various stages of providing systems. Also look for more entrants on the vendor side.

- **Productivity:** It is our general conclusion that productivity needs to be improved by a factor of 2 to 4 for these systems to be truly economically viable as "production tools".

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Figure 11 delineates the estimated population for these products as of January 1, 1982.

```
┌─────────────────────────────────────────────────────────────┐
│ USA/Canada                          Worldwide (Estimate)      │
│                                                               │
│ Crosfield    13               Crosfield      80 - 90          │
│ Scitex       22               Scitex         40 - 50          │
│ HCM           8               HCM            20 - 30          │
│                                                               │
│ Totals:     43 Units          Approx.       165 Units         │
│                    January 1, 1982                            │
└─────────────────────────────────────────────────────────────┘
```

Figure 11:   Estimated Population (On Order or Installed)

With this population in the first 2 years of these products, and continued technical progress in the systems as pointed out herein, we continue with our projection of some 300 units installed in the USA by the end of 1987.

Substantially lower pricing (possibly as early as 1985/86) could significantly increase this projection, whereas failure to increase productivity by 2 to 4 times will decrease this forecast.

System strategies of the three current suppliers differ significantly and require potential users to carefully evaluate system performance against actual production jobs to be placed on the system. Careful analysis of which jobs to place on such a system can go a long way toward increasing productivity.

Regarding system strategy, the following is a very brief introduction to the file handling strategy of the three current systems.

Figure 12 is representative of the HCM strategy (to be updated at DRUPA).

Here an input/output station is tied to the CP340 or DC350. Upon input, two files are developed; one being the fine file, which is representative of the
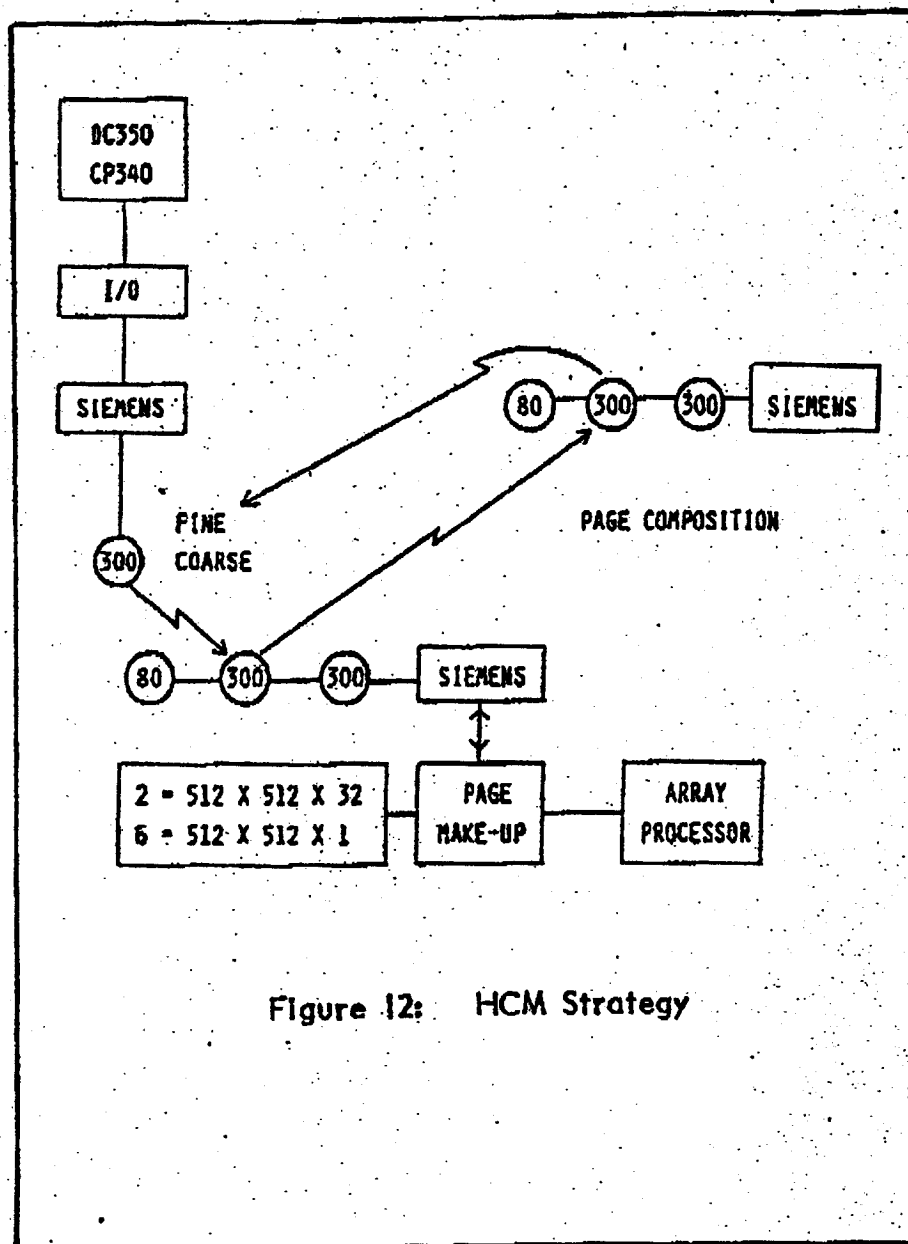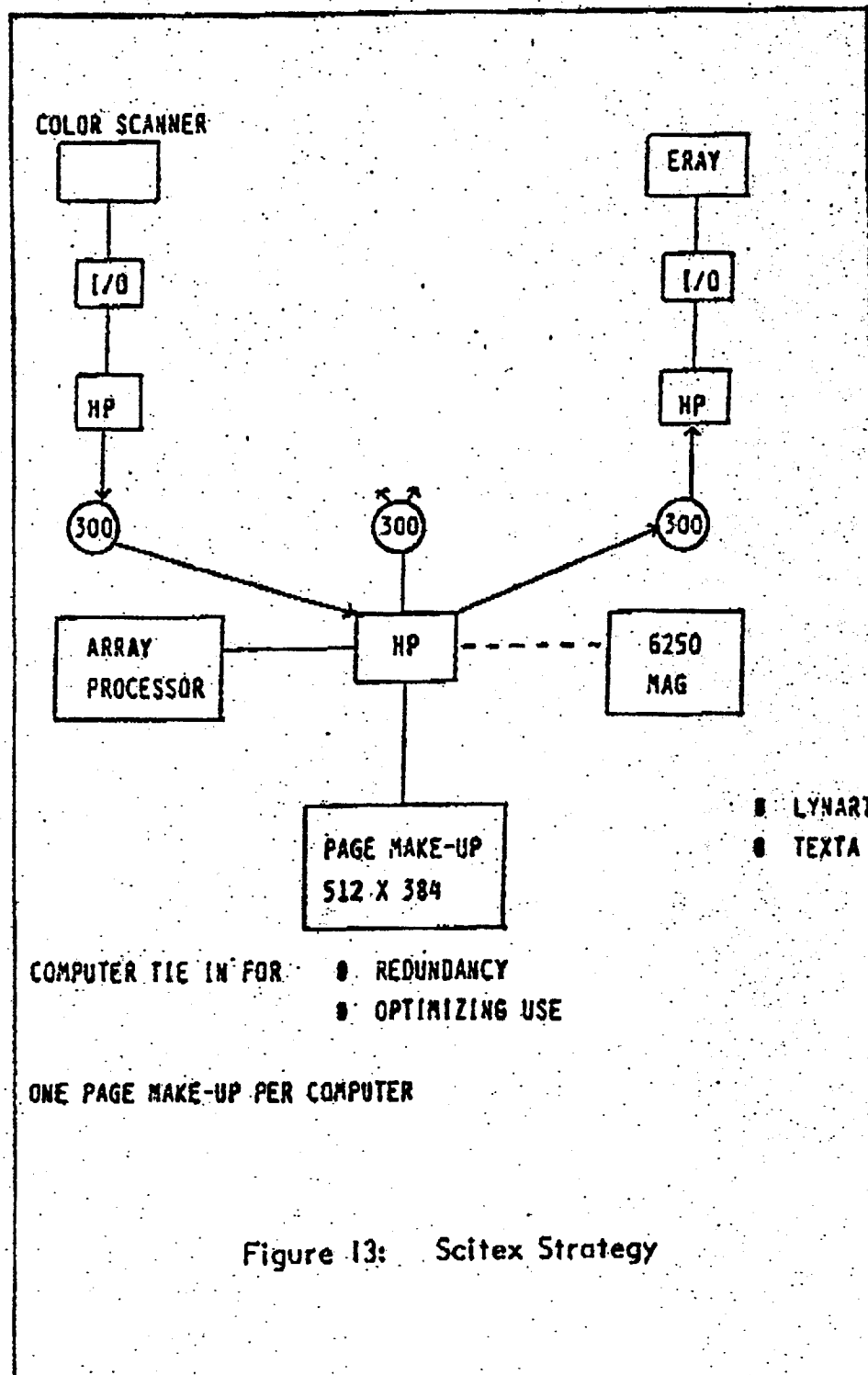
Figure 12:   HCM Strategy

full resolution of the image at output, the other being a view (coarse) file whose resolution (size) is determined by page size parameters. Typically this view file is about 1/50 of the fine file.

The 300 Megabyte pack is then carried to a page make-up terminal where the view file is used for stripping, page composition, rotation, etc. When outline, color correction, silhouetting functions are used, the fine file is accessed, manipulated and when the desired effects have been achieved, the fine file is recalculated. The acquisition of the fine file for display work and the recalculation of the fine file, both slow down the productivity of the color terminal; HCM has improvements on the way.

When the page(s) is(are) completed, the pack is then carried to the page composition computer where all the remaining calculations to compose the page are carried out. This time can vary from 20 minutes to over 1-1/2 hours, depending on the complexity of the job, number of rotations, etc. After this activity, the pack is carried back to the input/output station for final plotting.

Figure 13 provides a general schematic for the Scitex system. Here, there is an input station, output station, and page make-up station. The Scitex 300 megabyte disk drives are dual ported to allow for access of data on any drive by two computers. This facilitates redundancy, foreground/background use of the computers to archive to tape and to do page composition calculations while the three main computers are servicing their main functions.

On input, Scitex only accesses and stores a fine file. When view files are needed for the display, they are recalculated for each acquisition by the display terminal.

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COLOR SCANNER

ERAY

I/O

I/O

HP

HP

300

300

300

ARRAY PROCESSOR

HP

6250 MAG

PAGE MAKE-UP

512 X 384

COMPUTER TIE IN FOR   ● REDUNDANCY

● OPTIMIZING USE

ONE PAGE MAKE-UP PER COMPUTER

● LYNART

● TEXTA

Figure 13:   Scitex Strategy

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As with HCM, certain functions are performed on the fine file immediately after manipulation on the display; in this case, rotation, color correction, silhouetting, etc. As with HCM, this reduces the productivity of the display terminal as it waits for these calculations to be accomplished on the fine file. With Scitex, these calculations appear to go faster due to the use of the array processor on the fine file.

In theory, no disk packs have to be carried around in the Scitex system. In practice, since it can take 6 minutes to copy from one disk to another, disk packs are still carried around the Scitex system.

Once the page is completed on the display, the Scitex system has the capability of doing page composition on any computer that has access to the disk pack where the data resides. This can be done in the background on the least busy computer tied to the right disk.

After page composition, the disk pack is carried, hooked to, or transmitted to the output station for final plotting.

Crosfield's basic strategy differs in several significant features from its competitors. Figure 14 is a block diagram of the 860. First, there are four computers in a basic system: input, output, file manager (page composition), and page make-up. Their strategy seems to be intimately tied to the 1024 x 1024 display and its presumed ability to be of sufficient resolution to allow color correction, silhouetting, at the screen resolution, thereby not dealing with the fine file at these display iterations.

At input, two files are developed, the fine file and a view file. The purpose of the Winchester disk on the input station is to allow calculation of the view file. Here, the view file is calculated to be a 1024 x 1024 file (if the fine file is that size or larger). That is the view file will fill the color display and typically represents 1/5 to 1/10 of the pixels of the fine file. Immediately after input to the Winchester, the view file is recorded on the 300 Megabyte pack

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which is then carried to the file manager. Note the file manager supports up to four page make-up terminals. When one wants to work on a page, all the view files of the elements of the page are called from the file manager and stored on a 160 Megabyte Winchester at the page make-up terminal. Page make-up proceeds as with other systems, but instead of modifying the fine file, the view file is modified, potentially saving significant display terminal time. Once page make-up is complete, the page composition commands are sent back to the file manager where in a foreground/ background mode, the fine files are manipulated into the final page(s). When this is complete, the pack is carried to the output station for final plotting.
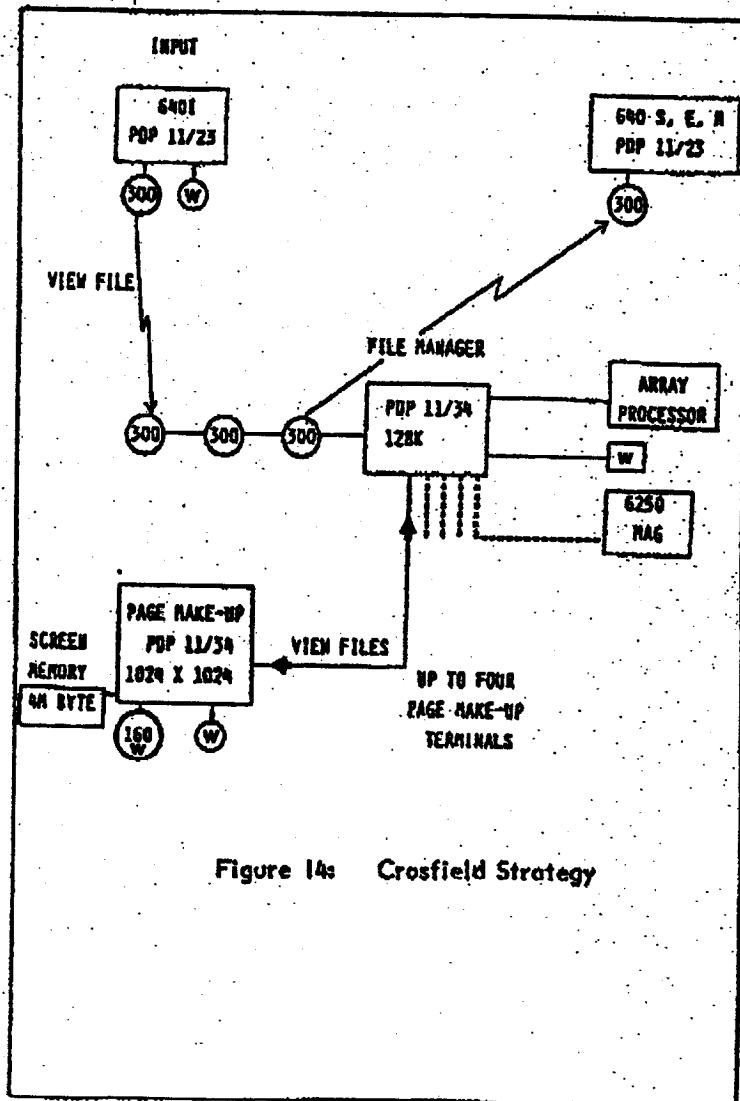
Figure 14:   Crosfield Strategy

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Since none of these systems (Crosfield, HCM, and Scitex) are fully operational at this time, one is forced to look at evolving strategies to estimate potential productivity. Further, pricing has not stabilized in the industry, thus it is next to impossible to determine productivity/cost merits. Based on strategy alone, we would rate the likely ultimate productivity of these systems in the following descending order:

Crosfield
Scitex
HCM

Based on usable functions (by existing customers) we would rate the competitors in the following descending order:

Scitex
HCM
Crosfield

Low Resolution Typesetting

We have previously reported that some 50-plus (Reference 3) companies are in various stages of consideration and/or development of various technologies for non-impact printing (NIP). The dominant technology being considered is laser-based intelligent copiers, with other technologies such as ion beam, magnetography, thermal magnetic, ink jet, etc. also being considered. The prime driving forces behind laser-based systems can be summarized as:

- Highest ultimate quality
- Moderate relative capital costs
- Lowest cost consumable (plain paper plus toner)
- High speed

We have previously reported on Tropel, Honeywell, and Litton (Reference 3) as sources of laser scanning modules to be used with slightly modified copier engines. These electro optics houses provide design,

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development, and OEM quantity manufacturing to potential system houses. Their designs range from galvanometer to polygon to holographic scanners with polygon scanners remaining the current most popular choice.

We have also previously reported on the Canon, Data Point, Hewlett-Packard Xerox, IBM, Siemens, General Optronics, Konishiroku, Mita entrants into the laser imaging- electrophotographic-based systems (Reference 3). One serious deficiency of all of these systems is a lack of good typeface design used with these machines.

This is being slowly rectified as various leading suppliers of these new imaging systems announce typeface supply agreements with historic typesetter companies (such as the recently announced Mergenthaler/Xerox deal). Look for more such announcements in the near future, such as Monotype who claims large unannounced contracts in this area.

But even more important to the lower cost laser-based NIP systems is the lack of an appropriate image driver for the NIP subsystem. Canon, General Optronics, etc. all suffer from the fact that their laser-based NIP systems are basically dumb bit map video plotters with no capability to receive word processor front-end system codes and set type. These devices are analogous to buying a daisy wheel printer without the daisy wheel.

What is needed is an image driver for these devices, preferably one that can handle typesetting functions, line art, and halftones. Xerox appears to have the lead here with its continuing product announcements. Imagen, a Standford University spin-off, has developed such a device for the Canon LBP-10 system.

Despite the general lack of an "image driver" (i.e. interface with at least typesetting capabilities), the number of OEM suppliers of scanner subsystems is multiplying rapidly.

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:poten-
alvano-
polygon
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Canon,
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river"
abili-
ubsys-

- Chesapeake

  Brad Merry, formerly of Isomet and Kodak, has formed a new company to provide laser scanning modules based on low cost, solid state (acousto-optic) scanners (Reference 4). These developing products are focused on the 240 lpi, 30 page per minute market. They claim that at this speed range, they can use standard video circuits to reduce the price of the power supply, which has previously caused high prices for this scanning technique.

- Lincoln Lasers

  We have previously covered Lincoln Lasers as the leading manufacturer of polygons (Reference 4) for laser scanning as well as a developer of an internal drum scanner intended for laser platemaking type applications.

  Now Lincoln Lasers has entered the laser scanning subsystem market with its own "off the shelf" polygon laser scanner, primarily intended for use during the development phase of a new scanner sub-module. It has variable resolution and scan speed to aid in development testing programs. Primary design features include a 2 to 3 mil spot, video rates of 7 to 10 MHz, a digitally driven AO modulator (50 nanosecond), and running at 1200 lines/sec. (or 30 pages per minute). This versatile prototyping scanner is estimated to sell for $24,000.

- Newport Electro-Optics

  Eddie Young, formerly with Harris, has formed (with the support of Newport Research) another company to provide a scanner subsystem based on a variety of scanning mechanisms. Like Chesapeake and Lincoln, Newport will initially focus on the 240 - 300 lpi scanners for the laser NIP market. All three companies are said to be interested in the 1000 lpi-plus area for the graphic arts.

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● General Scanning

General Scanning is also rumored to be entering the OEM and systems scanning business. General Scanning is the leading supplier of optical galvanometer scanners, such as used in the initial EOCOM Laserites (as provided to The Los Angeles Times).

E.   Summary - Laser NIP

Figure 15 summarizes the OEM suppliers of laser scanning subsystems.
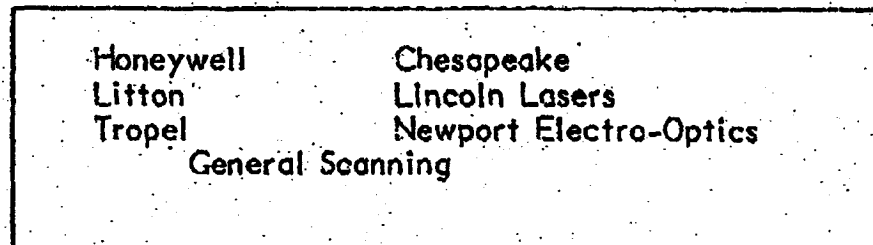
Honeywell	Chesapeake
Litton	Lincoln Lasers
Tropel	Newport Electro-Optics
General Scanning	

Figure 15: OEM Suppliers of Laser NIP Kits

Note in Reference 2, we made the case that laser NIP kits, in quantity, can be procured for around $3,000. More importantly, it is not expensive to increase the resolution of these devices to 500 lpi. At 500 lpi, these devices, as producers of originals, will compete favorably with the printed result of offset, where the original imagery is typically 1000 lpi, but then is degraded by 5 or more image transfers in going from typesetter output to ink on paper.

If one extends these types of costs versus performance data, several things can be projected:

● 500 lpi proofing devices will be capable of high quality proofing.

● 500 lpi direct original copy devices will compete favorably against short run offset.

● Laser typesetters, when mature as a technology, will cost less to manufacture than CRT typesetting.

- Combined with the ability of current laser typesetters to set text, line art and halftones at text speeds, bodes well for laser typesetting technology, as well as laser NIP for proofing and original copy generation.

Typesetting - More Suppliers

As the industry struggles to make the transition to full page output of text, line art, and halftones, very interesting things are happening. First, concurrent with the development period for new full page devices, the typesetting industry is undergoing a significant stabilization in the markets for 2nd and 3rd generation devices. The result of this is curtailed R/D dollars for the transition to full page devices inclusive of halftones, thus historic suppliers of typesetting equipment are trying to milk current technologies which are not suited to the evolving digital printing and publishing industry.

This is leading to some strange developments in the typesetting industry.

- At least four front-end page make-up suppliers have active programs to build output laser scanners that will, in the end, be typesetters; setting type, line art, and halftones at the same speed.

- EOCOM, through its Raster Image Processor development, plans to move into the typesetting business.

- Kodak and Agfa are likely to support their recent acquisitions with laser compatible materials. Both Kodak and Agfa have experience in laser scanning; and both have a vested interest in the laser NIP market.

- Scitex, HCM and Crosfield are bringing text into their color page make-up systems.

Thus, a field already in trouble, will see a real increase in vendors, with the new vendors depending on full page output and 4th generation technology for their success.

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